

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte T. HWEE NG, HADI K. MAHABADI,
MAN C. TAM, GREGORY J. KOVACS,
ERIC M. PETERS and RAFIK O. LOUTFY

Appeal No. 95-0770
Application 07/929,457¹

ON BRIEF

Before WINTERS, WILLIAM F. SMITH Administrative Patent Judges and MCKELVEY,
Senior Administrative Patent Judge.

WILLIAM F. SMITH, Administrative Patent Judge.

¹ Application for patent filed August 12, 1992. According to appellants, this application is a continuation of application 07/724,078, filed July 1, 1991, which is now abandoned.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1-21 and 28, all the claims pending in the application.

Appellants' claims are directed to a process for preparing copolymers of monomers having unsaturated carbon-to-carbon bonds. Claims 1 and 4 are representative of the claims on appeal and are reproduced below:

1. A process for preparing copolymers which comprises, in the order stated: (1) adding monomers containing unsaturated carbon-to-carbon bonds, two polymerization initiators, namely a first polymerization initiator with a 10 hour half-life temperature of from about 50EC to about 95EC and a second polymerization initiator with a 10 hour half-life temperature of from about 85EC to about 130EC, and a solvent to a reaction vessel; (2) purging the resulting solution with an inert gas; (3) sealing the reaction vessel and pressurizing it by the addition of an inert gas to a pressure of from about 20 to about 600 kilopascals above ambient atmospheric pressure; (4) maintaining the temperature within the pressurized reaction vessel at a substantially constant temperature within the range of from about 50 to about 100EC for a period of from about 60 to about 300 minutes; (5) thereafter maintaining the temperature within the pressurized reaction vessel at a substantially constant temperature within the range of from about 80 to about 115EC for a period of from about 30 to about 300 minutes, wherein the temperature in step 5 is higher than the temperature in step 4; and (6) subsequently maintaining the temperature within the pressurized reaction vessel at a substantially constant temperature within the range of from about 115 to about 160EC for a period of from about 30 to about 180 minutes, wherein the temperature in step 6 is higher than the temperature in step 5, wherein the resulting copolymer is substantially free of gel formation

4. A process according to claim 1 wherein the monomers are styrene, ethyl acrylate, and acrylic acid.

The examiner relies on the following references:

Kamath (Kamath '696)

4,125,696

November 14, 1978

Appeal No. 1995-0770
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Kamath et al. (Kamath '703)	4,129,703	December 12, 1978
Sanchez	4,129,704 ²	December 12, 1978

Reactivity, Mechanism and Structure in Polymer Chemistry, A.D. Jenkins and A. Ledwith, John Wiley & Sons (NY 1974), pp. 158-74.

A reference of record relied upon by this merits panel is:

Tam (Tam '307)	4,853,307	Aug. 1, 1989
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Claims 1-21 and 28 are rejected under 35 U.S.C. § 112, first paragraph, on the grounds that the term “substantially constant” temperature is not supported in the specification as filed. Claims 1-21 and 28 are rejected under 35 U.S.C. § 112, second paragraph, on the grounds that the term “substantially constant” is indefinite. Claims 1-21 and 28 are rejected under 35 U.S.C. § 103 as unpatentable over Kamath '696 in view of Kamath '703. Claims 1-21 and 28 are rejected under 35 U.S.C. § 103 as unpatentable over Kamath '696 in view of Sanchez and Kamath '703.

We reverse the rejections under 35 U.S.C. § 112, first and second paragraphs, and vacate the rejections under 35 U.S.C. § 103. We make a new ground of rejection under the provisions of 37 CFR § 1.196(b).

DISCUSSION

The rejections under 35 U.S.C. § 112, first and second paragraphs

² We note that the Examiner's Answer misstates the Sanchez patent number. Answer page 2. Appellants' Brief states the number correctly. Brief page 4.

Claims 1-21 and 28 stand rejected under 35 U.S.C. 112, second paragraph, for indefiniteness. The examiner found the use of the term “substantially constant” to be indefinite. Claims 1-21 and 28 stand rejected under 35 U.S.C. 112, first paragraph, for lack of support in the specification. The examiner found that an amendment introducing “substantially constant” to modify a temperature in the claims was not supported in the specification as filed.

Because the two rejections under the first and second paragraphs of 35 U.S.C. § 112 are based on the meaning of the term “substantially constant,” our first inquiry is to determine if the claims comply with the requirements of the second paragraph. If the claims in fact are particular and definite, the analysis then turns to the first paragraph of the statute. In re Moore, 439 F.2d 1232, 1235, 169 USPQ 236, 238 (CCPA 1971).

“Substantially constant” is a term of degree that was not expressly defined by the specification. Its acceptability depends on whether one of ordinary skill in the art would understand what is claimed. W. L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1557, 220 USPQ 303, 316 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984); Seattle Box Co. v. Industrial Crating & Packing, 731 F.2d 818, 826, 221 USPQ 568, 573-74 (Fed. Cir. 1984). See also Hybritech, Inc. V. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1385, 231 USPQ 81, 95 (Fed Cir. 1986) (“the claims, read in light of the specification, reasonably apprise those skilled in the art and are as precise as the subject matter

permits. As a matter of law, no court can demand more”), cert. denied, 107 S. Ct. 1606 (1987).

The claims as originally filed may be fairly read as embracing a process where temperature was held within a range during each of the three polymerization stages: “... maintaining ... a temperature within the range of from about n to about mEC.” Original claim 1. On August 12, 1992, Appellants filed an amendment inserting “substantially constant” before temperature in the quoted phrase, expressly relying on Example 1 for support. Paper No. 9 page 8.

The examiner maintains that “[a]ppellants’ use of ‘substantially constant’ in the claims is indefinite.” The examiner’s explanation is that “[t]he temperature held constant can be considered as substantially constant but not over the temperature range claimed.” Answer page 6. We do not agree with the examiner that the claim means temperature is held constant over the range claimed. The amendment inserting “substantially constant” clarified the claims such that a temperature selected from within the range would be maintained, as exemplified by the specification in Example 1, page 43. Thus, the amended claims are in contrast to the originally filed claims, and particularly point out an embodiment similar to Example 1.

Appellants argue that the claims define the invention with a reasonable degree of particularity and distinctness when read in view of the entire disclosure. We agree. The rejection finding the claims indefinite is reversed.

We now turn to the rejection under the first paragraph of 35 U.S.C. § 112. In deciding whether new matter has been added to a claim without support in the specification as filed, we note initially that the specification as a whole must be considered. In re Wright, 866 F.2d 422, 425, 9 USPQ2d 1649, 1651 (Fed. Cir. 1989). We have carefully reviewed the specification and claims as originally filed, and find they describe a process comprising three stages of varying duration. The specification further describes the selection of a separate temperature to be maintained during each stage.

The selected temperatures are described at specification pages 17 and 18. We quote from the section describing the first polymerization stage:

[g]enerally the temperature selected within this range is a temperature at which the first initiator will become active and is about 10EC below the 10 hour half-life decomposition temperature, and polymerization is initiated. The temperature is maintained in this range for a period of from about 60 to about 300 minutes, and preferably from about 120 to about 240 minutes.
(Our emphasis)

The examiner directs attention to Example 1 at specification page 43. Although the examiner finds support in Example 1 for the concept of maintaining a selected temperature, the examiner states “[t]he Examples do not state the temperature is maintained approximately at that temperature or near that temperature or other phrases which might lend support to appellants’ use of ‘substantially constant’.” Answer page 5. Because the example does not use words such as “approximately” or “near”, the examiner infers that no variation in the maintained temperature may be tolerated in the claims.

The statute requires that the specification provide enough description that persons of skill in the art would recognize that applicant is the inventor of the claimed subject matter. In re Gosteli, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989); In re Wilder, 736 F.2d 1516, 1520, 222 USPQ 369, 372 (Fed. Cir. 1984). Also, it is well settled that a claim limitation need not be supported with the identical words. In re Wertheim, 541 F.2d 257, 265, 191 USPQ 90, 98 (CCPA 1976); In re Lukach, 442 F.2d 967, 969, 169 USPQ 795, 796 (CCPA 1971).

To the extent the examiner's rejection may be based on lack of support for the word "constant", we have no doubt that appellants' originally filed specification satisfies the statutory requirement with its description of a selected temperature being maintained. The passage of the specification quoted above plainly states that the selected temperature for the first polymerization stage is "about 10EC below the 10 hour half-life decomposition temperature". (Our emphasis) In the context of this description, "substantially constant" is a reasonably precise expression for maintaining a selected temperature that is "about" 10EC below a reference temperature.

We do not find the absence of words such as "approximately" or "near" to be dispositive because elaborating the word "about" with more terms such as "approximately" or "near" would be superfluous. "It is not required that the application describe the claim limitations in greater detail than the invention warrants." Martin v. Mayer, 823 F.2d 500, 505, 3 USPQ2d 1333, 1337 (Fed. Cir. 1987).

Considering the disclosure as a whole, including the specification, the Example 1, and the original claims, we find sufficient evidence that persons skilled in the art would recognize that appellants were in possession, as of the filing date, of the invention as now claimed. Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555, 1563, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). The rejection under 35 U.S.C. § 112, first paragraph is reversed.

The rejections under 35 U.S.C. § 103

In relevant part, the examiner's rejections hinge upon the following conclusions (Examiner's Answer, page 5):

It would have been obvious to one of ordinary skill in the art to substitute the three temperature ranges taught by Sanchez for the process taught by Kamath '696 and to substitute other high temperature initiators as taught by Kamath['703].

However, our review of the record indicates that neither appellants nor the examiner have appreciated the relevance Kamath '703 has in determining the patentability of the claims on appeal. For example, as discussed in detail below Kamath '703 describes a polymerization process using initiators, monomers and a three stage heating schedule as required by claim 1 on appeal. We see no reason to expend the resources needed in order to determine whether the examiner's proposed modifications of Kamath '696 are proper under 35 U.S.C. § 103 where there is appreciably better evidence of obviousness available. Accordingly, we vacate the examiner's prior art rejections in lieu of the new grounds of rejection set forth below.

New Ground of Rejection Under 37 CFR § 1.196(b)

Under the provisions of 37 CFR § 1.196(b), we make the following new ground of rejection.

Claims 1 through 21 and 28 are rejected under 35 U.S.C. § 103. As evidence of obviousness, we rely upon Kamath '703 and Tam '307.

Claim 1

a. Prima facie case

Kamath '703 describes the following process for preparing copolymers.

(1) Monomers containing unsaturated carbon-to-carbon bonds and two polymerization initiators, one a low temperature initiator, the other a high temperature initiator, and a solvent can be added to a reaction vessel. See column 4, lines 20-32 (styrene and other unsaturated monomers); column 2, line 61 - column 3, line 16 (low temperature initiator may be t-butylperoxypivalate and high temperature initiator may be di-t-butyl diperoxyazelaate); column 5, lines 1-4 (polymerization can be conducted in solution through use of solvent).

(2) The reaction vessel can be purged with an inert gas and sealed. See column 5, lines 27-30 (the reaction vessel is purged with nitrogen and sealed).

(3) The polymerization can occur using a 3-step heating schedule. See, e.g., Example 4 (first stage conducted at 90E C for three hours, the second stage at 115E C for two hours, and the third stage at 130E C for one hour.). The temperature during each temperature stage can be held constant. See, e.g., column 5, lines 31-33 and column 6, lines 59-60.

It is also noted that one of the advantages attributed to the method described in Kamath '703 is that the resulting polymer is substantially free of monomer. See, e.g, column 7, lines 64-68.

The above method described in Kamath '703 differs from that required by claim 1 on appeal in two respects. First, Kamath '703 does not explicitly describe that aspect of claim 1(3) which requires pressurizing the sealed reaction vessel by a further addition of an inert gas to a pressure of from about 20 to about 600 kilopascals above ambient atmospheric pressure. Second, Kamath '703 does not explicitly describe that the resulting copolymer is "substantially free of gel formation."

As to the first difference, we point out that Kamath '703 does describe purging the reaction vessel with an inert gas followed by sealing the reaction vessel. As described in Kamath '703, the sealed reaction vessel is then subjected to elevated temperatures. According to the ideal gas law, $pV=nRT$. Since the sealed system in Kamath '703 is subjected to elevated temperature, the pressure therein must rise during the polymerization process. With that thought in mind and keeping in mind that Kamath '703 indicates that the reaction vessel is to be purged with an inert gas prior to sealing, it stands to reason that Kamath '703 describes a polymerization process which occurs under elevated pressure in the presence of an inert gas. To determine an optimal pressure to be used in the process of Kamath '703 and ensure that that pressure is achieved by the addition of a specific amount of inert gas as required by claim 1 on appeal would have

been obvious to one of ordinary skill in the art. In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980)(Optimization of result effective variable is within the skill of the art.).

As to the requirement of claim 1 on appeal that the resulting copolymer is substantially free of gel formation, we note that Kamath '703 does not report that gel formation is a problem. Furthermore, while the specification of this application indicates that the one of the objects of the present invention is to form copolymers which are substantially free of gel formation, e.g., page 12, lines 11-12, the specification does not appear to teach how one goes about accomplishing that goal. Rather, the emphasis in the working examples of the specification is on achieving another stated object of the present invention, i.e., producing a copolymer which is substantially free of residual monomers. That goal is clearly taught by Kamath '703.

Be that as it may, where as here the prior art describes substantially the same process as claimed it is reasonable to shift the burden to appellants to establish that the three step polymerization process described in Kamath '703 does not result in a copolymer which is "substantially free of gel formation" as required by claim 1 on appeal. In re Best, 562 F.2d 1252, 1254-1255, 195 USPQ 430, 432-433 (CCPA 1977).

In our view, these facts establish that claim 1 on appeal would have been prima facie obvious to one of ordinary skill in the art from a consideration of Kamath '703.

b. Evidence of non-obviousness

Appellants rely upon the working examples on pages 43-47 of the specification as evidence of nonobviousness. Example I prepares a terpolymer according to the process set forth in claim 1 on appeal. The significant parameter discussed in this example is the residual monomer content of the terpolymer. Example I reports that no detectable levels of residual styrene or ethyl acrylate remained.

The first two comparative examples use either a 2-stage heating schedule (Comparative Example A) or a single stage heating step (Comparative Example B). Since Kamath '703 clearly and unambiguously describes a polymerization process which has three distinct and separate heating stages as required by claim 1 on appeal, these comparative examples are not representative of the closest prior art. In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980). Comparative Example C does not set forth the manner in which the comparative copolymers were prepared. Thus, it is not relevant in determining the patentability of claim 1 on appeal.

c. Holding

Since appellants' evidence of nonobviousness is not based upon a comparison with the closest prior art, it is entitled to little if any weight. Comparing the evidence of non-obviousness with the evidence of obviousness, we hold that the subject matter of claim 1 on appeal would have been obvious within the meaning of 35 U.S.C. § 103.

Claims 2, 3, 7, 8, 11, 12, 14 through 16, 18, and 28

The limitations added to independent claim 1 by these dependent claims are all specifically taught in Kamath '703. For claims 2 and 3, see column 4, lines 20-32. For claims 7, 8 and 28, see column 2, line 55-column 4, line 50. For claims 11, 12 and 14-16, see column 4, lines 3-10. For claim 18, see column 7, lines 64-66. Accordingly, they warrant no further discussion.

Claims 13 and 17

Claim 13 requires that the temperature in step 5 be from about 100 to about 110°C. Claim 17 requires that the pressure is maintained at from about 50 to about 400 kilopascals above ambient atmospheric pressure. As set forth above, temperature and pressure are result effective variables in the process described by Kamath '703. As such, it would have been prima facie obvious to one of ordinary skill in the art to optimize these parameters. Id.

Claims 4 through 7, 9, 10, and 19 through 21

Claims 4 through 7 limit the monomers used in independent claim 1 to specified amounts of styrene, ethyl acrylate, and acrylic acid. Claims 9 and 10 limit the method of independent claim 1 to specified solvents and amounts of solvent. Claims 19 through 21 limit independent claim 1 to producing copolymers exhibiting a specified polydispersity value or molecular weight.

Tam describes terpolymers comprising styrene, ethyl acrylate and acrylic acid. See, e.g., column 16, line 25 - column 17, line 28. The terpolymer of Tam '307 is to be used in

the same context as the terpolymer produced according to the claimed process, i.e., migration imaging members. For this purpose, Tam '307 teaches that the terpolymer should have a dispersity value (m_w/m_n) of at least about 2 or greater and a m_w within the range of about 25,000 and about 80,000. See, e.g., column 16, lines 25-51 and Examples XVIII-XX of Tam '307.

Taking a step back and viewing the disclosures of Kamath '703 and Tam '307 together, we hold that it would have been obvious to one of ordinary skill in the art to use the polymerization process of Kamath '703 to form terpolymers in accordance with Tam '307 (specific monomers, polydispersity values and m_w) since Kamath '703 indicates that the use of that procedure results in a polymerization process which will proceed quicker and produce a polymer having minimal residual monomer content. See, e.g., column 1, lines 8-19 and column 7, lines 64-68 of Kamath '703.

Tam '307 specifically describes the use of toluene as a solvent in the formation of the terpolymer. Thus, it would have been obvious to one of ordinary skill in the art to use toluene as the solvent in Kamath '703 for forming a terpolymer of styrene, ethyl acrylate and acrylic acid. To the extent that Tam '307 does not expressly describe the amount of solvent required by claim 10 on appeal, once again, this would be a result effective variable which would be routinely optimized by one of ordinary skill in the art. Id.

Time Period for a Response

Appeal No. 1995-0770
Application No. 07/929,457

This opinion contains a new ground of rejection pursuant to 37 CFR § 1.196(b) (amended effective Dec. 1, 1997, by final rule notice, 62 Fed. Reg. 53,131, 53,197 (Oct. 10, 1997), 1203 Off. Gaz. Pat. & Trademark Office 63, 122 (Oct. 21, 1997)). 37 CFR § 1.196(b) provides that, "A new ground of rejection shall not be considered final for purposes of judicial review."

37 CFR § 1.196(b) also provides that appellant, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of proceedings (§ 1.197(c)) as to the rejected claims:

(1) Submit an appropriate amendment of the claims so rejected or a showing of facts relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the application will be remanded to the examiner. . . .

(2) Request that the application be reheard under § 1.197(b) by the Board of Patent Appeals and Interferences upon the same record. . . .

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

REVERSED - 37 CFR § 1.196(b)

Appeal No. 1995-0770
Application No. 07/929,457

Sherman D. Winters
Administrative Patent Judge

William F. Smith
Administrative Patent Judge

Fred E. McKelvey, Senior
Administrative Patent Judge

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Appeal No. 1995-0770
Application No. 07/929,457

Judith L. Byorick
XEROX CORPORATION
Xerox Square 020-A
Rochester, NY 14644

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